A REVISION OF THE BURMESE PARADOXOSOMATIDAE (DIPLOPODA, POLYDESMIDA) IN THE MUSEO CIVICO DI STORIA NATURALE AT GENOA (PART II) [1]

by

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Abstract

The present paper, a sequel to that in Tijdschr. Ent. 108: 95—144 (1965), treats the species of *Orthomorpha* Bollman, emend. Jeekel, 1968. *Orthomorpha clivicola* Poc., *O. palonensis* Poc., *O. monticola* Poc., and *O. gestri* Poc., as well as *O. karschi intercedens* Attems are brought into the synonymy of *O. insularis* Poc., and the status of this species and of *O. karschi* (Poc.) and *O. fuscocollaris* Poc. are discussed.

The second part of the revision of the Pocock types in the Genoa Museum deals with the species referable to *Orthomorpha* Bollman, in the emended sense as proposed in 1968. It covers the material which Pocock referred to *Orthomorpha karschi, O. clivicola, O. palonensis, O. monticola, O. gestri, O. fuscocollaris,* and *O. coarctata.* The remaining types, all belonging to the genus *Antheromorpha* Jeekel, 1968, will be treated in the third and last part.

Orthomorpha Bollman

1893 *Orthomorpha* Bollman, Bull. U.S. natn. Mus. 46: 159, 196.
1963 *Orthomorpha*; Jeekel, Tijdschr. Ent. 106: 261.
1964 *Orthomorpha*; Jeekel, Tijdschr. Ent. 107: 355.

Remarks. — In the above cited papers I already discussed the difficult and still very unsatisfactory taxonomy of *Orthomorpha* and related groups of species. The study of the Burmese material of *Orthomorpha* proper enables me to make some more definite statements on the status of the species of the *karschi*-group. Unfortunately the systematic position of *O. fuscocollaris* must remain somewhat dubious until the male of this or a closely related species is discovered.

Orthomorpha coarctata (De Saussure)

1895 *Orthomorpha coarctata*; Pocock, Annali Mus. civ. Stor. nat. Genova 34: 809.

Material.

Palon, coll. Fea, 1 ♂, 1 ♀. Bhamo, coll. L. Fea, 2 ♂. Malewoon, coll. L. Fea, 1 ♀.

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[1] Based on data, accumulated through the aid of a grant (I 954—36) from the Netherlands Organisation for the Advancement of Pure Research (Z.W.O.) and the Italian National Council of Research (C.N.R.)

Orthomorpha karschi (Pocock)

1889 *Paradesmus Karschi* Pocock, J. Linn. Soc. London 21: 293, pl. 24, fig. 5—5b.
1895 *Orthomorpha karschii*; Pocock, Ann. Mus. civ. Stor. nat. Genova 34: 817.
1936 *Orthomorpha (O.) karschi*; Attems, Mem. Ind. Mus. 11: 197, fig. 30.
1937 *Orthomorpha (O.) karschii*; Attems, Tierreich 68: 70, fig. 87—88. (excl. synonymy).

Material.

This species was originally described from King Island and Sullivan Island in the Mergui Archipelago. In 1895 Pocock recorded it from Malewoon, collected by Fea, and from South Tenasserim, collected by Oates. The material collected by Oates is presumably in the British Museum, London. The Fea material was located in the Genoa Museum and consists of two female specimens, upon which the following description has been based.

Malewoon, coll. L. Fea, 2 ♀.

Description.

Colour. — See Pocock, 1889, 1895.

Width. — 6.0 mm, 5.8 mm.

Head and antennae. — Labrum widely, but very weakly emarginate, tridentate. Clypeus moderately convex, moderately impressed towards the labrum; the lateral border widely rounded, with a deep notch near the labrum. Headplate moderately setiferous in the clypeus, sparsely setiferous in the frontal region; the surface rugulose in the clypeus, otherwise smooth. Vertex hairless. Antennal sockets separated by one and two fifths times the diameter of a socket or by almost three quarters of the length of the 2nd antennomere. Postantennal groove wide, moderately deep; the wall in front rather weakly prominent. Vertex moderately convex; the sulcus moderately impressed, running downwards to just below the upper level of the antennal sockets. Antennae of moderate length, rather stout, distinctly clavate. Pubescence moderate in the proximal antennomeres to rather dense in the distal ones. Length of antennomeres: $2 = 3 = 6 > 4 = 5$.

Collum. — (Fig. 1). Distinctly wider than the head. Anterior border faintly convex in the middle, scarcely more rounded laterally and along the lateral keels. Posterior border faintly concave in the middle to almost straight; at the base of the keels a wide obtuse-angled edge. Posterior margin of the lateral keels scarcely emarginate; the latero-posterior edge obtuse-angled, very narrowly rounded. Surface hairless, shiny, smooth or faintly reticulate-rugulose. Transverse convexity moderate and even, the lateral keels slightly raised, but still declined. Marginal rim laterally moderately wide, becoming very narrow along the middle of the collum. Posterior margin of the keels with a fine but distinct rim.

Somites. — Prosomites dull, almost silky. Constriction weak. Stricture narrow, dorsally finely beaded, faintly striate below the level of the lateral keels down to the level of the stigmata. Metatergites shiny, hairless, smooth or somewhat coriaceous, especially behind the transverse furrow and in the caudal somites. Transverse furrow present from the 5th to the 18th somite, weakly indicated in the 4th somite. The furrow moderately impressed, finely and distinctly longitudinally striolate. A weak longitudinal furrow may be present, especially in front of the transverse furrow. Sides with a minute granulation, especially in their lower and caudal parts. In the anterior somites the granulation is sparse. Pleural keels in the 2nd to 4th somites represented by well develo-

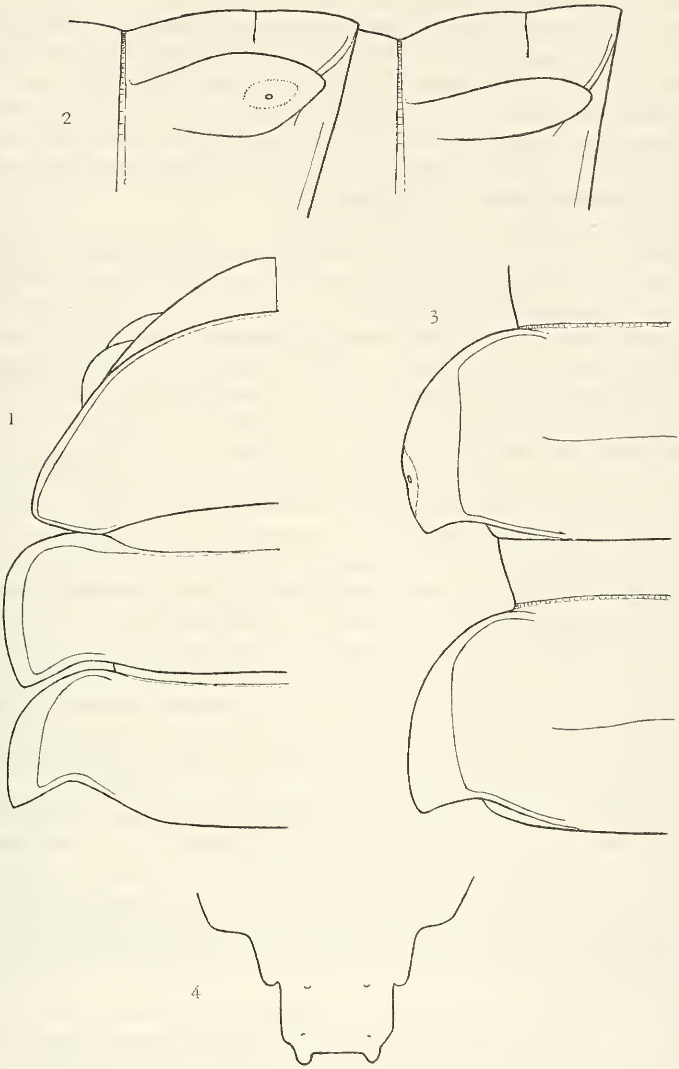

Fig. 1—4. *Orthomorpha karschi* (Poc.). 1, left side of head and first three somites of ♀, dorsal aspect; 2, left side of 10th and 11th somite of ♀, lateral aspect; 3, the same, dorsal aspect; 4. epiproct of ♀, dorsal aspect

ped ridges; the posterior edge in the 2nd somite obtuse-angled, not projecting caudad of the border of the somite, in the 3rd somite acute-angled, in the 4th about right-angled, and in both slightly projecting. In the 5th and subsequent somites the pleural keels are represented by a well developed swelling above the anterior legs and a rounded lappet near the caudal border, which are gradually less developed in the subsequent somites but which remain present up to the 17th somite. In the 18th somite they are slightly indicated. From the 5th somite onwards there is a distinct ridge, marked off by a furrow, parallel to the posterior border, which remains visible up to the 17th somite. In the 3rd and 4th somites these ridges are weakly developed.

Lateral keels. — (Fig. 1—3). The 2nd somite wider than the collum, and scarcely wider than the 3rd; the 3rd and 4th somites of equal width. Anterior border of the keels of the 2nd somite distinctly shouldered at base, widely rounded, passing gradually into the lateral border by a slightly narrower rounding. Lateral border also widely rounded. Latero-posterior edge about rectangular. Posterior border at base emarginate, otherwise faintly convex. Keels about horizontal, below the level of those of the third somite. Marginal rim rather thick. Keels of 3rd somite also shouldered at base, the anterior and lateral borders widely convex, slightly more so where they pass into each other. Latero-posterior edge subrectangular. Posterior border faintly concave. Keels of 4th somite subsimilar to those of the 3rd, the anterior border scarcely shouldered at base. The latero-posterior edge not pointed but very narrowly rounded, scarcely projecting behind the caudal margin of the metasomite. Marginal rims of the 3rd and 4th keels thicker than those of the 2nd. Keels of the 5th and subsequent somites with anterior and lateral borders almost continuously evenly rounded, up to the 14th somite the base of the anterior border is weakly shouldered. Posterior edges subacuminate, acute-angled from about the 12th somite onwards and from the 14th somite onwards projecting slightly behind the caudal margin of the somites. Marginal calluses very thick, in particular in the poriferous somites, occupying more than the half or almost two thirds of the dorsal surface of the keels. Pores in a slight elliptical excavation of the calluses, lateral.

Sternites and legs. — Sternites of middle somites as long as wide. Cross impressions with the transverse furrow well developed, the longitudinal furrow weak. Pubescence moderately dense; no sternal cones. Legs of moderate length, rather stout. Pubescence moderately dense on all sides, the hairs short; only the tarsi a little more densely setiferous. Length of podomeres: $3 > 6 > 2 = 5 > 4$, the 6th podomere almost three quarters of the length of the 3rd. Last two pairs of legs a little shorter than the preceding ones, but not modified.

Anal somite. — (Fig. 4). Epiproct of moderate length, broad, thick, ventrally a little concave. The sides concave only at base, than slightly converging towards the basal setiferous tubercles, from there parallel or even a little diverging towards the weak distal setiferous tubercles. The end broadly truncate, with a pair of widely separated, rather small and slender uncate cones, the end of which points straightly ventrad. Paraprocts strongly rugose, the rims rather narrow, but high, and with a strongly developed premarginal depression. Setae on weakly defined, coarse and low tubercles. Hypoproct triangular, broad, the sides weakly convex, the posterior edge obtusely angulate. Setiferous tubercles well developed, projecting behind the margin, but not equalling the median edge.

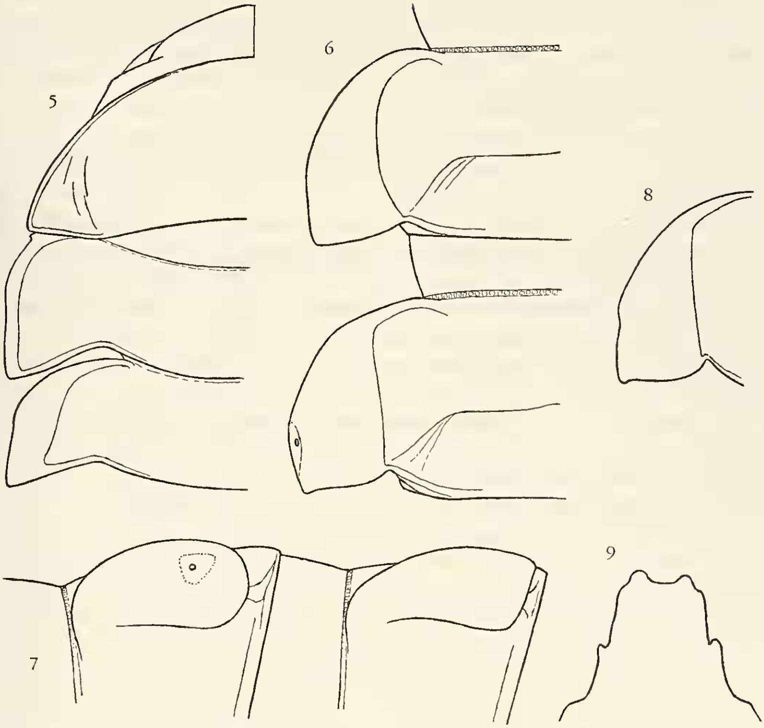

Fig. 5—9. *Orthomorpha insularis* Poc. (♂ lectotype of *O. clivicola* Poc.). 5, left side of head and first three somites, dorsal aspect; 6, left side of 11th and 12th somites, dorsal aspect; 7, left side of 10th and 11th somites, lateral aspect; 8, left keel of 15th somite, dorsal aspect; 9, epiproct, dorsal aspect

Remarks.

The male characters of this species have been described and illustrated by Attems (1936). According to his figures the gonopods of *karschi* are extremely similar to those of *O. insularis* Poc. (Fig. 15), differing apparently only in a comparatively slightly shorter femur.

Orthomorpha insularis Pocock

1895 *Orthomorpha insularis* Pocock, Annali Mus. civ. Stor. nat. Genova 34: 817, fig. 15.
1895 *Orthomorpha clivicola* Pocock, l.c.: 819.
1895 *Orthomorpha palonensis* Pocock, l.c.: 820, fig. 16.
1895 *Orthomorpha monticola* Pocock, l.c.: 820.
1895 *Orthomorpha gestri* Pocock, l.c.: 820.
1936 *Orthomorpha karschi insularis*; Attems, Mem. Ind. Mus. 11: 199.
1937 *Orthomorpha karschii insularis*; Attems, Tierreich 68: 71, fig. 89.
1937 *Orthomorpha karschii intercedens* Attems, Tierreich 68: 71.
1964 *Orthomorpha monticola*; Jeekel, Tijdschr. Ent. 107: 360 fig. 7.
1964 *Orthomorpha insularis*; Jeekel, l.c.: 360 fig. 8.

Material.

Orthomorpha insularis was based on a large number of male and female specimens collected on Reef Island (Tavoy) by E. W. Oates, which are in the British Museum, London. There is no typical material of this species in the Genoa Museum, and the types of *insularis* have not been studied.

O. clivicola was based by Pocock on four examples from Mt. Mooleyit, 1800—1900 m, of which there are now one male and one female in the Genoa Museum. The British Museum has one specimen from this locality. The male in the Genoa Museum has been labelled now as lectotype, the female as paratype. Pocock mentioned also six specimens from Puepoli and one male from Thagata. The specimens from Puepoli are at present not at Genoa, but there is a female in the British Museum, and according to Weidner, one specimen in the Hamburg Museum. In the Genoa Museum the male from Thagata is present, and, moreover, a female from Meteleo, not recorded by Pocock.

O. palonensis was based on "a large number of specimens" from Palon. Of these there are now at Genoa one male, one female, and two juveniles, and the male has now been labelled as lectotype, the other three specimens as paratypes. The British Museum has a male and two female specimens of *palonensis,* and Weidner records one specimen in the Hamburg Museum.

O. monticola was based on three male specimens, of which there are two, now labelled as lectotype and paratype, in the Genoa Museum.

O. gestri was described after two specimens from Kokareet. One of these is in the Genoa Museum, and one in the British Museum. Pending the designation of the specimen in London as lectotype, the Genoa specimen has now been labelled as paratype.

O. clivicola: Mt. Mooleyit, 1800—1900 m, III. 1887, coll. L. Fea, ♂ lectotype, ♀ para-

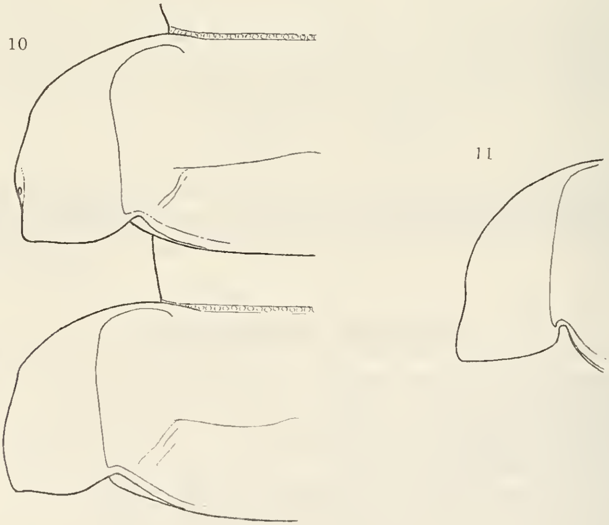

Fig. 10—11. *Orthomorpha insularis* Poc. (♂ lectotype of *O. palonensis* Poc.). 10, left side of 10th and 11th somites, dorsal aspect; 11, left keel of 15th somite, dorsal aspect a little from the right side.

type. Thagata, Mooleyit, 500—600 m, coll. L. Fea, 1 ♂. Meteleo, VI.1888, coll. L. Fea, 1 ♀.

O. palonensis: Palon, coll. L. Fea, ♂ lectotype, ♀ paratype, 1 juv. ♂ paratype (19 somites), 1 juv. ♀ paratype (19 somites).

O. monticola: Bia Po (Carin Cheba), 1000—1200 m, coll. L. Fea, ♂ lectotype, ♂ paratype.

O. gestri: Kokareet, II. 1887, coll. L. Fea, ♂ paratype.

Description.

Colour. — See Pocock and Attems.

Width. — Males in the order of the above enumeration: 5.1, 5.0; 5.6; 5.8, 5.6; 5.0 mm. Females, do.: 6.3, 6.1; 6.3 mm. Juv. ♂: 3.8 mm. Juv. ♀: 3.9 mm.

Head and antennae. — Labrum moderately widely and moderately deeply emarginate, tridentate. Clypeus rather weakly convex, rather weakly impressed towards the labrum. Lateral border of clypeus widely rounded, widely emarginate near the labrum. Headplate smooth and shiny, moderately setiferous in the clypeal part, sparsely so in the frontal region. Antennal sockets separated by one and one third of the diameter of a socket, or by slightly more than two thirds of the length of the 2nd antennomere. Postantennal groove wide, moderately deep, the wall in front moderately prominent. Vertex moderately convex, the sulcus well impressed, running downward to just below the upper level of the antennal sockets. Antennae of moderate length, rather stout, a little clavate. Pubescence moderate in the proximal antennomeres to rather dense in the distal ones. 2nd to 6th antennomeres of subequal length.

Collum. — (Fig. 5, 16). Much wider than the head. Anterior border weakly convex, gradually a little more so towards the sides. Posterior border faintly concave, almost straight, at base of lateral keels more or less abruptly convex. The posterior border of the lateral keels faintly concave, straight, or faintly convex. Latero-posterior edge rectangular or somewhat obtuse, subacuminate. Marginal rim laterally distinct but rather narrow, the premarginal furrow fading away along the anterior border. Larger part of surface shiny, a little uneven, with some hairs, on the lateral keels somewhat rugulose, along the caudal margin reticulate-rugulose. Transverse convexity moderate, the lateral keels raised but not attaining a horizontal level.

Somites. — Rather weakly constricted. Prosomites dull, silky. Stricture narrow, dorsally distinctly ribbed, striolate down from the lateral keels to the level of the stigmata. Metatergites of 2nd and 3rd somites shiny, somewhat uneven. Subsequent tergites finely rugulose to subgranulose. Tubercles are faintly indicated near the base of the lateral keels in front of and behind the transverse furrow, particularly in the anterior half of the body. In the middle of the tergites these tubercles are indicated only by coarse wrinkles, especially along the caudal border. Transverse furrow present from the 5th to the 18th somite, generally weakly indicated also on the 4th and 19th tergites, moderately impressed. Sides rather densely granular. Pleural keels of the 2nd to 4th somites represented by strong ridges caudally produced into acute or rectangular lappets which project more or less behind the margin of the somites. Pleural keels of the 5th to 7th somites generally also represented by complete ridges, but in the males of *"clivicola"* they are more or less interrupted in the middle. The posterior lappet is acute-angled or rectangular and projects scarcely or not behind the margin of the somite. From the 8th somite onwards the pleural keels are represented by a granular, rounded swelling above the anterior legs and an acute, rectangular, or obtuse lappet which does not project

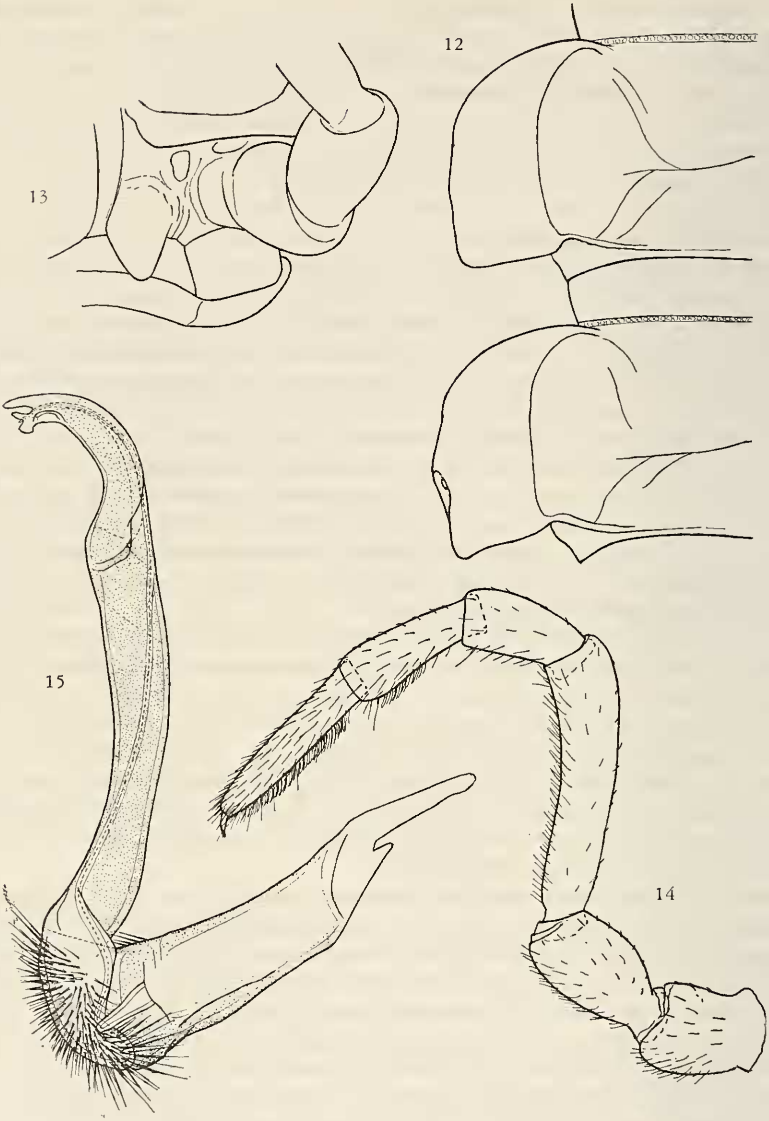

Fig. 12—15. *Orthomorpha insularis* Poc. (♂ lectotype of *O. monticola* Poc.). 12, left side of 11th and 12th somites, dorsal aspect; 13, left side of sternal area of 7th somite, lateral aspect; 14, leg of 7th somite; 15, right gonopod, medial aspect

behind the caudal margin. In the 15th somite the lappet is indicated only, rounded; on the 17th or 18th somite it has disappeared. Likewise the anterior swelling disappears in the 16th or 17th somite. From the pleural keels upwards runs a premarginal furrow parallel to the caudal margin of the somites.

Lateral keels. — (Fig. 5—8, 10—12, 16—17). 2nd somite somewhat wider than the collum, about as wide as the 3rd. 4th somite wider than the 3rd. Keels of 2nd somite with the anterior border widely rounded, shouldered at base. Latero-anterior edge obtuse, with a more or less distinct lateral tooth. Lateral border widely rounded or practically straight, slightly sinuous. Posterior border widely rounded, the latero-posterior edge about rectangular, projecting a little caudad of the posterior margin of the somite. Marginal rim of moderate width. Keels about horizontal or slightly raised above the horizontal level. Keels of the 3rd somite with the latero-anterior border widely rounded, with a more or less distinct sinuation laterally. Posterior edge somewhat obtusely to somewhat acutely angular. Anterior border shouldered at base. Posterior border practically straight, the edge somewhat projecting. Marginal rim thick. The keels distinctly above the level of those of the 2nd somite, raised above the horizontal level. Keels of the 4th somite similar to those of the 3rd, but the latero-anterior border more regularly rounded and not or very weakly sinuous. Posterior edge slightly acute or rectangular, generally not projecting. Posterior border faintly convex, a little concave at the base. Keels raised a little more than in the 3rd somite, almost level with the middle of the metatergite. Keels of the 5th and subsequent somites with the latero-anterior border widely and somewhat irregularly rounded, more or less sinuate laterally, shouldered at base up to the 15th to 17th somites. Posterior edges obtuse-angulate to rectangular, becoming acute in the 13th or 16th to 19th somites. The edges narrowly rounded to subacuminate. Posterior border somewhat convex, more or less deeply incised at the base of the keel, especially deeply incised between the 13th and 17th somites. Posterior margins of keels transverse on longitudinal axis in some specimens between the 5th and 14th somites, otherwise inclining a little backwards. Posterior edges projecting behind the caudal margin of the somite from between the 9th and 15th somite onwards. Keels raised above the middorsal level generally from the 5th to the 18th somite, in *"gestri"* only from the 6th to the 11th and again from the 15th to the 18th somite. Marginal calluses very thick, demarcated dorsally as well as ventrally by a furrow, occupying almost the entire dorsal surface of the keels (in the *"gestri"* male a little less than in the other specimens).

Sternites and legs. — (Fig. 13—14). Sternites of middle somites as long as wide or slightly longer than wide, pubescence moderate. Cross impressions with the transverse furrow well impressed, the longitudinal furrow very weak. Sternite of 5th somite with a pair of moderately widely separated, more or less strongly developed, low, rounded, hairy cones directed downwards. Posterior part rather deeply excavated in the middle, the transverse furrow more or less distinct. Sternite of the 6th somite deeply excavated in the middle, the caudal part scarcely elevated above the ventral level of the metasomal ring. Transverse furrow obsolete in the middle. Sternite of 7th somite with a pair of strong cones cephalo-laterad of the gonopod opening, projecting downward. Sternite of 8th somite not modified. Legs rather long and rather stout. Pubescence moderate, the ventral side of the prefemur and femur in the anterior half of the body rather densely setiferous. Distal tibial and tarsal brushes present in the legs of the anterior and middle somites, thinning out in the legs of the posterior somites, and absent in

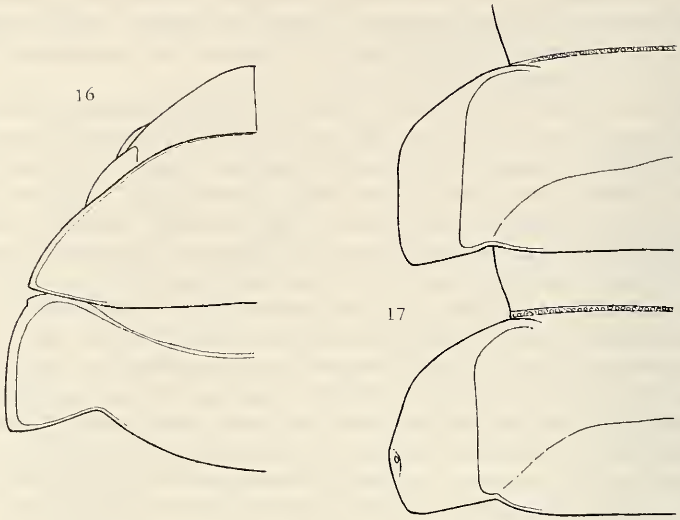

Fig. 16—17. *Orthomorpha insularis* Poc. (♂ paratype of *O. gestri* Poc.). 16, left side of head and first two somites, dorsal aspect; 17, left side of 11th and 12th somites, dorsal aspect.

the legs of the 17th or 17th and 18th somites. Length of podomeres: $3>6>5=2>4$, the 6th podomere two thirds of the length of the 2nd.

Anal somite. — (Fig. 9). Epiproct of moderate length, rather broad, thick, ventrally a little concave. The sides concave at base, otherwise straight and converging moderately. The basal lateral tubercles well developed, the distal lateral tubercles weak or almost obsolete. The end broadly truncate, with two rather widely separated conical tubercles pointing downward. Paraprocts strongly rugose. The marginal rims high, but rather narrow, with a deep premarginal impression. Setae on coarse, low tubercles. Hypoproct broadly triangular, the sides weakly convex, the posterior edge obtuse-angulate. Setiferous tubercles well developed, projecting behind the margin but not equalling the posterior edge.

Gonopods. — (Fig. 15). Of the usual *Orthomorpha* type. Coxa slender, gradually widening distad. Femur comparatively long, the postfemoral region laterally distinctly demarcated by an oblique furrow. Apex of tibiotarsus trilobate, two elongate lobes separated by a narrow slit and a slightly more proximal subquadrate lobe.

Female. — Slightly more robust than the male. The antennal sockets separated by five sixths of the length of the 2nd antennomere. Antennae only weakly clavate. The 4th antennomere slightly shorter than the 2nd, 3rd, 5th and 6th. Latero-posterior edge of collum slightly obtuse. Posterior margin at base of keels of collum rounded, scarcely angular. Pleural keels represented by complete ridges only in the 2nd to 4th somites, from the 5th somite onwards separated in a swelling above the anterior legs and a lappet near the caudal margin of the somite. Lateral keels with the posterior edges projecting in the 2nd and 3rd and in the 16th to 19th somites, the edges acutely angular only in a few anterior somites and in some somites caudad of the 15th. In some of the middle somites the keels are not raised above the middorsal level. Sternites of middle somites scarcely broader than long. Length of podomeres: 3>6>2>5>4. Epiproct relatively a little broader.

Remarks.

After careful consideration of the descriptions by Pocock and study of the material in the Genoa Museum, I have come to the conclusion that *insularis, clivicola, palonensis, monticola,* and *gestri* are one and the same species. The differences mentioned by Pocock mainly concern the outline and height of the lateral keels, and details of coloration. The species is a comparatively large-sized one and probably Pocock was too much impressed by differences in an absolute sense which are not at all so important in a relative sense.

Undoubtedly, *O. insularis,* as regards the shape of the lateral keels, is a variable species. Variations occur, however, between specimens from a single locality, between the various somites of a single specimen, and even between the right and left sides of a single somite. A close comparison of the shape of the lateral keels of the available specimens did not yield any sufficiently reliable character to justify the distinction of five species or even subspecies. Only *gestri* may eventually prove to be a distinguishable subspecies, but the available material of this form is too scanty at present.

Although *O. insularis* is closely related to *O. karschi,* there appears to be no reason to follow Attems in associating the two subspecifically. The metatergites in *karschi* are much smoother and shinier than in *insularis.* The marginal calluses of the lateral keels in *karschi* are considerably smaller than in *insularis,* the keels are not directed upwards and lack the incision at the base of the posterior border. The pair of cones latero-cephalad of the gonopod opening in *insularis* has not been mentioned by Attems in his description of *karschi.* The two species differ furthermore in colour: in *karschi* the collum is entirely or almost entirely yellow, the metatergites including the keels are yellow with only a narrow zone immediately behind the stricture being black; in *insularis* the anterior half of the collum is black, the caudal half yellow, and the metatergites are blackish up to the transverse furrow, and sometimes the base of the keels behind the furrow is infuscate *("gestri").*

O. karschi intercedens appears to fall within the variability of *insularis.* It was distinguished from *insularis* only by the more pronounced caudal edges of the lateral keels.

Orthomorpha fuscocollaris Pocock

1895 *Orthomorpha fusco-collaris* Pocock, Annali Mus. civ. Stor. nat. Genova 34: 822, fig. 18.

Material.

This species was based on two female specimens from Malewoon. One of these is at present in the Genoa Museum and has now been labelled as lectotype. The other female is in the British Museum, London.

Malewoon, coll. L. Fea, ♀ lectotype.

Description.

Colour. — See Pocock. Posterior half of metatergites behind the transverse furrow, the lateral keels entirely, and the epiproct flavous.

Width. — 4.6 mm.

Head and antennae. — Labrum widely and rather weakly emarginate, tridentate. Clypeus rather weakly convex, moderately impressed towards the labrum. Above the

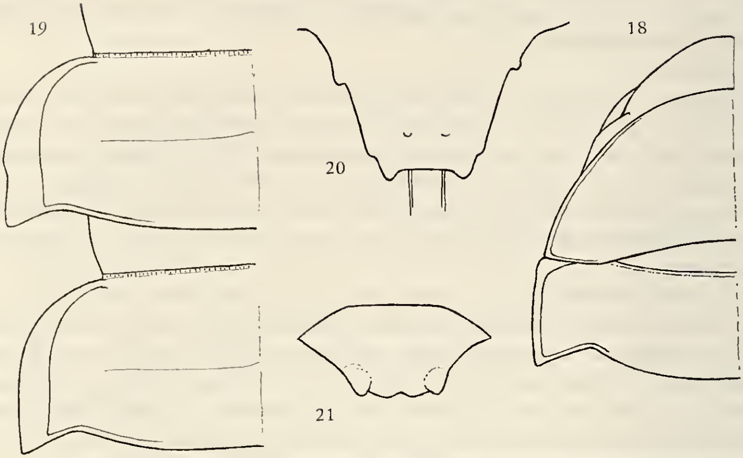

Fig. 18—21. *Orthomorpha fuscocollaris* Poc., ♀ lectotype. 18, left side of head and two first somites, dorsal aspect; 19, left side of 10th and 11th somites, dorsal aspect; 20, epiproct, dorsal aspect; 21, hypoproct, ventral aspect.

labrum a curved row of about ten low tubercles. Headplate with coarse rugae in the clypeal area, the remainder smooth and shiny. Clypeus probably moderately setiferous, the frontal region with some sparse hairs, the vertex presumably with one plus one hairs. Lateral border of clypeus widely rounded, rather deeply emarginate near the labrum. Antennal sockets separated by one and three fifths times the diameter of a socket or by almost nine tenths of the length of the 2nd antennomere. Postantennal groove well impressed, rather wide; the wall in front moderately prominent. Vertex moderately convex; the sulcus well impressed, running downward to just below the upper level of the antennal sockets. Antennae rather short and rather stout, somewhat clavate. Pubescence of all antennomeres rather dense, but short. Length of antennomeres: $2 = 3 > 4 = 5 < 6$. The 6th antennomere as long as the 2nd.

Collum. — (Fig. 18). Wider than the head. Anterior border widely rounded, a little stronger rounded towards the latero-posterior edge. Posterior border scarcely emarginate in the middle, laterally widely convex and practically strainght towards the latero-posterior edge. Latero-posterior edge about right-angled, subacuminate. Surface shiny, practically smooth, hairless, with a faint median furrow. Transverse convexity almost even, the lateral keels of the collum raised a little, but not horizontal. Marginal rim laterally moderately wide, the premarginal furrow fading away towards the middle of the anterior border.

Somites. — Rather weakly constricted. Prosomites very dull, silky. Stricture narrow, finely beaded down to the level of the lateral keels, below that level without distinct sculpture. Metatergites shiny, slightly leathery rugulose, hairless, with a faint median furrow. Transverse furrow present from the 4th to the 18th somite, rather deeply impressed. Caudad of the furrow some minute tubercles may be present, especially above the lateral keels. Sides minutely granular. Pleural keels of the 2nd to 4th somites represented by strongly developed ridges, posteriorly produced into a pointed edge, which projects behind the caudal margin of the somite in the 2nd and 3rd somites only. From the 5th somite onwards the pleural keels are represented by a swelling above the anterior legs and a pointed lappet above the posterior legs, which is caudally produced but does not project caudad of margin. The edge of the posterior lappet becomes obtuse-angulate from the 9th somite onwards and remains visible up to the 16th somite. From the 17th somite onwards the swelling and lappet are obsolete.

Lateral keels. — (Fig. 18—19). 2nd somite wider than the collum and wider than the 3rd, the 4th somite a little wider than the 3rd. Keels of 2nd somite a little shouldered at base, the anterior border widely rounded. Latero-anterior edge with a distinct tooth. Lateral border widely rounded. Latero-posterior edge acute-angled, subacuminate. Posterior border straight. Rim rather thick. The keels of the 2nd somite below the level of those of the next somite, somewhat declining laterad. Keels of the 3rd and 4th somites with thick marginal rims, the anterior and lateral borders widely rounded, with only a faintly indicated latero-anterior tooth. Keels of the 3rd somite horizontal, those of the 4th and subsequent somites slightly raised above the horizontal level. Poriferous keels with the pores lateral in an elongate oval excavation of the marginal rim. The marginal rims also ventrally demarcated by a furrow. The pre-marginal furrow along the caudal border of the lateral keels extends to about halfway the middle of the dorsum. Posterior edges of keels acute-angled, but not becoming spine-like in the caudal somites, projecting behind the caudal margin of the somites from the 2nd to the 19th somite.

Sternites and legs. — Sternites of middle somites somewhat longer than broad. Cross impressions distinct but not deeply impressed, the transverse furrow deeper than the longitudinal one. Pubescence moderate. Legs of moderate length, moderately slender, prefemur thickest of all podomeres, though not particularly incrassate. Pubescence ventrally moderate, rather dense only in the tarsi. Dorsal pubescence obsolete in the four basal podomeres, moderate in the tibiae, rather dense in the tarsi. Length of podomeres: $3>6>2>5>4$; the 6th podomere almost five sixths of the length of the 3rd.

Anal somite. — (Fig. 20—21). Epiproct thick, broad, rather short, ventrally slightly concave. Sides moderately converging; the basal lateral setiferous tubercles distinct, the distal lateral tubercles minute. The end truncate, with a pair of widely separated conical tubercles directed obliquely ventrad. Paraprocts somewhat rugulose, the setiferous tubercles small, the marginal rims moderately high and rather narrow. Hypoproct broad, trapezoidal, the sides concave, the posterior border rounded and medially incised. Setiferous tubercles strongly developed.

Remarks.

This species seems to belong to *Orthomorpha* s.str., and may come nearest to *karschi*, but as long as the male characters are not known, its relationship remains a matter of speculation.

REFERENCES

See the first part. In addition:

Jeekel, C. A. W., 1968. On the classification and geographical distribution of the family Paradoxosomatidae. Amsterdam, 162 pp., 5 figs, 6 maps.